WHAT IS CLAIMED IS:

1. A method for forming an isolation film for semiconductor devices, which comprises the steps of:

successively forming a first oxide film and a nitride film on a semiconductor substrate;

patterning the nitride film and the first oxide film to expose a portion of the semiconductor substrate, which corresponds to an isolation region;

implanting impurity ions into the exposed portion of the semiconductor substrate to form an impurity ion-implanted layer;

forming a spacer at the sidewall of the patterned nitride film, and at the same time, etching the ion-implanted layer using the spacer as a mask;

etching a portion of the semiconductor substrate exposed by the etching of the ion-implanted layer, using the spacer as a mask, thereby forming a trench;

removing the spacer;

annealing the trench so that the corner of the trench is rounded;

forming a second oxide film along the inner wall of the trench;

depositing a polarizing oxide film on the entire

surface of the resulting substrate in such a manner as to gap fill the trench;

subjecting the polarizing oxide film to chemical mechanical polishing (CMP) using the nitride film as a polishing stopper film, thereby polarizing the polarizing oxide film; and

removing the nitride and first nitride films remaining after the polarizing step.

2. The method of Claim 1, wherein the step of patterning the nitride film and the first oxide film is carried out by dry-etching with an activated plasma consisting of a gas mixture of CHF_3, CF_4, Ar and O_2.

3. The method of Claim 1, wherein the step of patterning the nitride film and the first oxide film is carried out by dry-etching with an activated plasma consisting of a gas mixture of CHF_3, CF_4, Ar, O_2 and C_xF_y.

4. The method of Claim 1, wherein the impurity ions are phosphorus or boron ions.

5. The method of Claim 1, wherein the spacer is made of polymer.

6. The method of Claim 1, wherein the etching of the ion-implanted layer provides an ion-implanted residual layer, which is formed by a multi-step dry etching process using the spacer as a mask.

7. The method of Claim 6, wherein the surface of the ion-implanted residual layer is rounded.

8. The method of Claim 6, wherein the multi-step dry etching process is carried out using a gas containing fluorine of a given amount as a main component.

9. The method of Claim 8, wherein the flow rate of fluorine is gradually increased as the multi-step dry etching process is progressed.

10. The method of Claim 8, wherein the flow rate of fluorine is gradually reduced as the multi-step dry etching process is progressed.

11. The method of Claim 1, wherein the step of etching the ion-implanted layer is carried out by dry etching with an activated plasma consisting of a gas mixture of CHF_3, CF_4,

Ar and O_2.

12. The method of Claim 1, wherein the step of etching the ion-implanted layer is carried out by dry etching with an activated plasma consisting of a gas mixture of CHF_3, CF_4, Ar, C_xF_y, N_2 and H_2.

13. The method of Claim 1, wherein the step of forming the trench is carried out by dry-etching the substrate with an activated plasma consisting of a gas mixture of HBr, Cl_2, O_2 and H_2.

14. The method of Claim 1, wherein the step of removing the spacer is carried out with a cleaning solution containing HF or H_2SO_4.

15. The method of Claim 1, wherein the second oxide film is a sacrificial oxide film acting to compensate for the damage of the trench inner wall.

16. The method of Claim 1, wherein the remaining nitride film is removed by phosphoric acid dipping.

17. The method of Claim 1, wherein the isolation film

is formed along the rounded corner of the trench.

5